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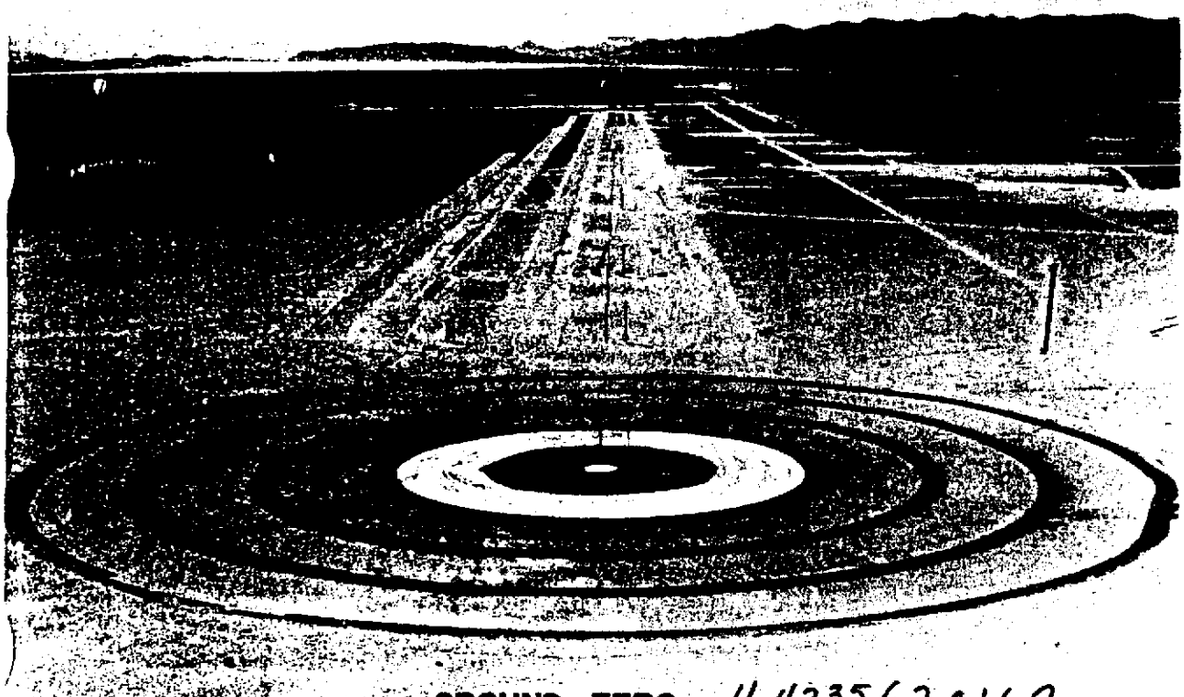
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EXERCISE

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DESERT ROCK IV

APRIL—JUNE 1952

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E X E R C I S E

D E S E R T R O C K I V

April - June 1952

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C16955-1

FOREWORD

This report on Exercise DESERT ROCK IV is submitted in compliance with par 2a(9), Letter, Headquarters Sixth Army, dated 19 March 1952, subject: "DESERT ROCK IV - Letter of Instruction No. 1."

The overall purpose of the report is to provide all branches of the armed forces with the latest information available from Exercise DESERT ROCK IV, for use in study and planning in connection with the possible employment of atomic weapons.

While the principal mission of the exercise was the indoctrination of troops and observers, attention was also given to blast and thermal effects on troop equipment, materiel, and emplacements under field conditions, and on live animals.

Information contained in the report is factual, but results from a series of single detonations of atomic devices of differing KT yields, differing methods of delivery, and differing heights of burst. Since no two detonations covered in the report had identical background, results from each detonation must be considered separately, and caution must be exercised in generalizing from this report on possible effects at predetermined distances from ground zero.

H. P. STORKE
Brigadier General, USA
Exercise Desert

[redacted]

[redacted]

DRB

SIXTH ARMY COMMANDER AND EXERCISE SUPERVISOR

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CAMP COMMANDER AND EXERCISE DIRECTOR

Brigadier General Harry P. Storke

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QUARTERMASTER OFFICER: Major Neal L. Caskey
JUDGE ADVOCATE: Major John W. Burtchaell
MEDICAL OFFICER: Major Anthony A. Stankus
PROVOST MARSHAL: Major James Peddie
VISITORS BUREAU: Major George M. McKelvey
ORDNANCE OFFICER: Captain Fred J. McNeal
SPECIAL SERVICE OFFICER: Captain Duane W. Bagley
CHAPLAIN: Captain Donald R. Bauter
HEADQUARTERS COMMANDANT: Captain Sam Gaye
POST EXCHANGE OFFICER: 1st Lt Arden N. Gaddis
TRANSPORTATION OFFICER: 2d Lt Fred R. Butterworth

[redacted]

[redacted]



GENERAL JOHN E. HULL, *VICE CHIEF* OF STAFF, U. S. ARMY
LT. GENERAL JOSEPH M. SWING, COMMANDING GENERAL, SIXTH ARMY

[redacted]

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TASK FORCE UNITS

Hq and Hq & Svc Co 369th Engineer Amphibious Support Regiment (Augmented)
Shore Battalion 369th Engineer Amphibious Support Regiment
562d Transportation Staging Area Company
23d Transportation Truck Company
31st Transportation Truck Company
Company "A", 505th Military Police Battalion
Detachment, 314th Signal Construction Battalion
216th Chemical Service Company
Detachment, Army Air Section, Sixth Army
369th Army Band
Detachment, 504th Signal Base Maintenance Company

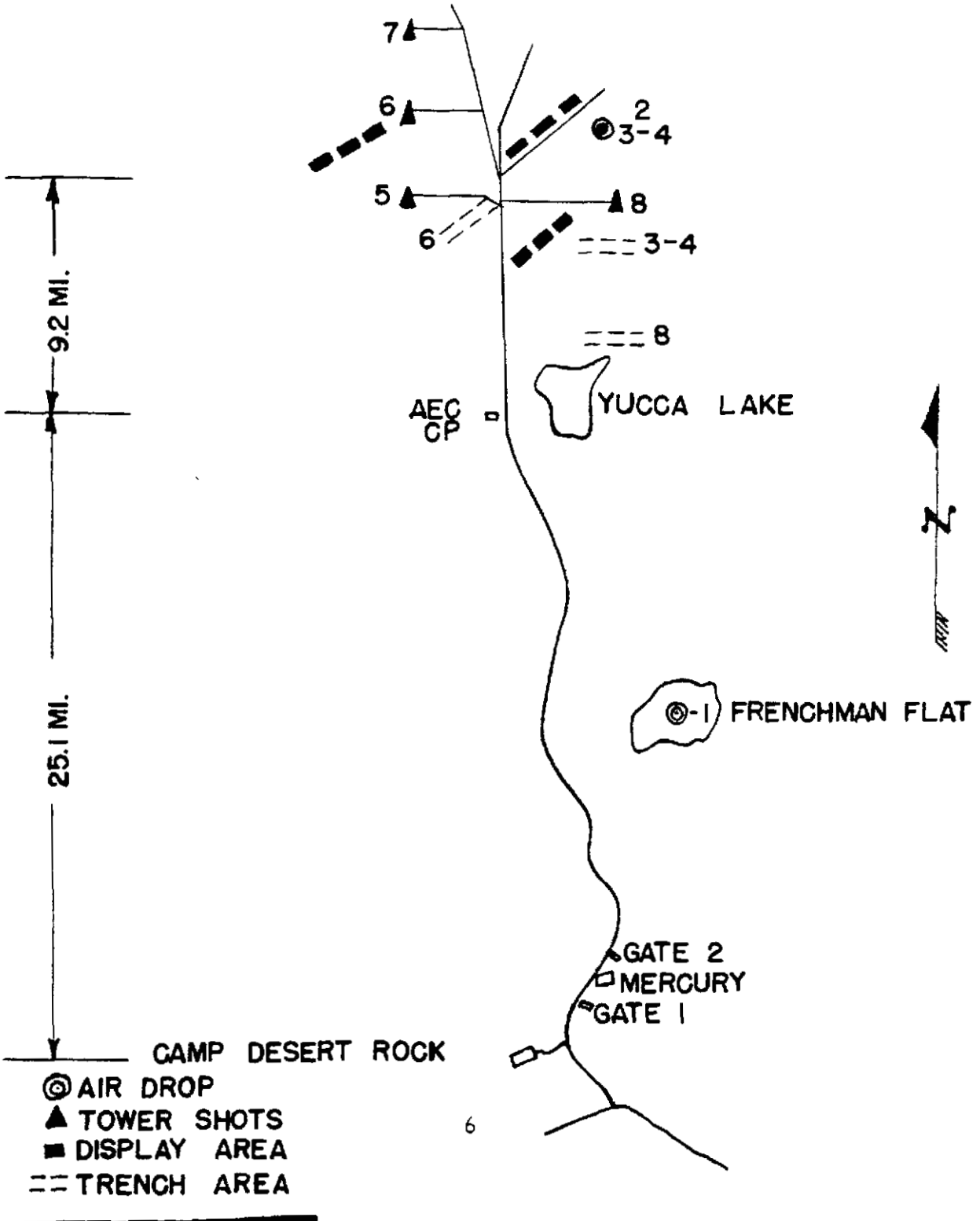
PARTICIPATING UNITS

2d Bn (-2 Co's) 504th Abn Inf Regt, 82d Airborne Division
Co "B", 167th Inf Regt, 31st Infantry Division
Co "C", 135th Inf Regt, 47th Infantry Division
Engineer Platoon, 369th Engr Amph Sup Regt
Medical Detachment, Sixth Army
Prov. Sq, 140th Fighter-Bomber Group
Prov. Sq, 187th Fighter-Bomber Sq
1st Prov Marine Battalion, Camp Pendleton, California
2d Prov Marine Battalion, Camp Lejeune, N. C.
Tank Platoon, 11th Armored Cavalry Regt
701st Armored Infantry Battalion, 1st Armored Division
Tank Platoon, 1st Armored Division
Engineer Platoon, 1st Armored Division
Medical Detachment, 1st Armored Division

[redacted]

[redacted]

RELATIVE LOCATION
OF
TOWER SHOTS and AIR DROPS



[redacted]

[redacted]

REPORT
of
EXERCISE DESERT ROCK IV

I. INTRODUCTION

Exercise DESERT ROCK IV, the U.S. Army designation for its participation in AEC operations TUMBLER/SNAPPER, the fourth in a series of atomic device exercises, was held at the Nevada Test Site, 65 miles northwest of the City of Las Vegas, Nevada, during the months of April, May, and June 1952.

II. MISSION

1. The mission of Exercise DESERT ROCK IV was, with the maximum Army participation possible, to provide indoctrination training in tactical operations featuring tactical employment of atomic devices, to provide training in essential protective measures, to observe psychological effects of atomic explosions on individuals, and, in a lesser degree than in Exercises DESERT ROCK I, II, and III, to provide indoctrination training in the effects of atomic explosion on equipment, materiel, and emplacements. For index of directives from Department of the Army, Office of the Chief of Army Field Forces, and Sixth Army concerning the mission of Exercise DESERT ROCK IV, see Annex I.

2. In general, the mission of Exercise DESERT ROCK IV was a continuation of the missions of the previous three Exercises DESERT ROCK. In this exercise it was desirable that Army participation continue its progress, within reasonable bounds of peace-time safety requirements, toward the objective of actual close-in operation of Army troops in the face of atomic explosions, approximating as nearly as possible actual war-time conditions. In connection with this progress, several notable advances were made during Exercise DESERT ROCK IV.

a. Troops were positioned for bursts at 7000 yards from ground zero, which was nearer than any known personnel have ever been so exposed, excluding the Japanese at Hiroshima and Nagasaki.

b. Greater independent responsibility was given U.S. Army personnel in connection with radiological safety than had been given in previous tests.

c. Participating troops were permitted nearer ground zero following the bursts than ever before; i.e., for Shot Number 3, this distance was 175 yards.

d. U.S. Army participants in Shot Number 8 were permitted to take up a tactical advance toward their objective immediately following the explosion, without waiting for the official AEC declaration of R-Hour (radiological clearance to advance into the shot area).

[redacted]

III. INDOCTRINATION

The missions of the Commanding General, Camp Desert Rock, as outlined above, were accomplished by the following means, for VIP observers, troop observers, and troop participants:

a. Pre-shot indoctrination on basic atomic theory, results of past exercises, and operational plans for the forthcoming shot.

b. Pre-shot explanatory visit to the Test Site.

c. Observation of the shot.

d. Post shot explanatory visit to display areas near ground zero.

e. Post exercise seminar for introduction to and discussion of major questions concerning possible Army operational and administrative doctrine for the atomic age.

IV. PARTICIPATION

Troop participation in the four atomic explosions comprising Exercise DESERT ROCK IV was based on the concept that aggressor strong points had repulsed attempts by friendly units to force a breakthrough into enemy held territory. Decision was made to use the atomic weapon to clear the way for penetration into enemy rear areas and installations.

After protective positions had been prepared and occupied approximately 7000 yards from the assumed enemy front lines, the atomic device was air dropped on two positions and fired from towers, thus to a degree simulating artillery bursts, at two other positions.

Following the explosion of the first of the two airdropped atomic devices, an Airborne unit executed a parachute drop in the rear of the enemy position and linked up with other Airborne and Regular Infantry units which had advanced through the vicinity of ground zero to the link-up area.

The second of the two air drops saw the participation of two Marine BCT's under the same circumstances and plan, except that no airborne drop was involved.

The first atomic device detonated from a tower and involving troop participation, furnished background for an Armored BCT to move toward the effects display area near ground zero. This phase of the exercise was the first in which Army CBR monitors alone were permitted to monitor and give the all clear signal for advance into the contaminated area.

[redacted]

Immediately after the firing of the second tower shot (simulated artillery burst), a BCT composed of Engineer Amphibious Support Troops (augmented) began a tactical march toward the explosion area without waiting for rad-safe clearance from the AEC or Army CBR monitors. Army Monitors advancing in front of this unit provided radiological safety. Tanks were used in the tactical movement to provide cover for troops on foot. Tank crews remained inside the tanks at 7000 yards from Ground zero during the explosion.

Throughout, individual participant observers were integrated with troop units, at the 7000 yard distance from ground zero, in indoctrination, and in witnessing the explosion. After the explosion the observers were moved to the equipment display area to witness blast and thermal damage effects on materiel, equipment, and emplacements.

V. PSYCHOLOGICAL REACTION

Psychological reaction research was conducted by two professional teams of psychologists in connection with selected troop units participating in Shots Number Three, Six, and Eight of the Atomic Energy's TUMBLER/SNAPPER series of detonations. For purposes of study and analysis, tests were conducted prior to an after orientation about the atomic device.

1. Human Resources Research Office proposed:

a. To measure the general level of troop information about atomic energy and effects of the device.

b. To measure troop attitudes toward the device and the maneuver.

c. To assess men's emotional feelings about maneuver situation.

d. To measure physiological reactions as indices of the men's emotional reactions.

e. To estimate men's efficiency in the performance of a typical, individual soldier's task.

Procedures, methods, and equipment used in testing by the Human Resources Research Team were set forth in their preliminary report, but findings will be delayed due to time required for detailed study and analysis of results obtained.

(Distribution of the complete findings, when published, will be made by Human Resources Research Office to addressees receiving this report).

[redacted]

2. Operations Research Office proposed:

a. To collect and evaluate opinions of troops obtained on question schedules.

b. To determine physical behavior of participants in the maneuver exercise.

c. To evaluate achievement in performance tests.

d. To evaluate physiological reactions to specific questions and statements about the atomic device.

Preliminary conclusions of Operations Research Office based on findings from Shot Number Three were:

a. When troops have been thoroughly indoctrinated, they are able to perform a well-rehearsed atomic maneuver adequately.

b. Evidences of emotional disturbances in prospective participants in an atomic device maneuver are more fully revealed through their physiological reactions than through their overt behavior.

c. That in combat conditions where an atomic device may be used, well indoctrinated troops may be expected to perform in a satisfactory manner.

(Distribution of complete findings by Operations Research Office, when published, will be made to addressees receiving this report).

3. In addition to tests conducted by the above mentioned organizations, Staff Personnel of Camp Desert Rock conducted surveys through I and E discussion groups and small informal meetings, to obtain quick check on attitudes before and after orientation as well as on the effectiveness of the orientation program.

A survey of six companies of troops composed entirely of station complement personnel indicated the following:

a. All troops were less fearful of the atomic device after indoctrination and witnessing of an atomic detonation.

b. Only one company indicated a belief that troops working in atomic units should be volunteers. Two companies failed to produce personnel willing to volunteer for atomic duty if the opportunity presented itself.

c. A large majority would be willing to move up to entrenchments at the two mile mark in demonstrations similar to those in Exercise DESERT ROCK IV.

[redacted]

d. Fear of the after effects of radiation still transcends all other fears connected with the atomic device.

e. All groups indicated a desire for additional information on radiation effects.

VI. FISCAL

The original estimate of overall cost for the operation of Exercise DESERT ROCK IV was computed at $466,425.00. This amount was deemed necessary to cover cost of movement of individual observers and participating troop units to Camp Desert Rock and return to home station, movement of impedimenta of participating troop units to and from Camp Desert Rock, and technical service requirements at Camp Desert Rock.

To cover the expense of the exercise, an allocation of $450,000.00 was made from Special Field Exercise funds. The Department of Navy and Department of Air Force paid proportionate shares of technical service requirements.

(Detailed fiscal report (Annex IV) will be distributed only to interested headquarters, after receipt of all vouchers and claims connected with the exercise).

VII DAMAGE EFFECTS

Damage effects data contained in this report are neither based on scientific calculations, nor are they to be considered conclusive proof of possible future effects under similar conditions.

Since the primary mission of Exercise DESERT ROCK IV was orientation and indoctrination of troop units and individual observers, an effort was made throughout the exercise to use only items of equipment that might affect the tide of battle in a tactical situation and to emplace them in as natural a location as possible. Every effort was made to show, through actual demonstration on the ground, what would happen to normal military equipment when exposed at various distances from ground zero, and to various sizes and types of bursts used in the different phases of the exercise.

Damage effects worthy of note and which seemed to apply alike to Shots Three, Six, and Eight include:

1. Lethal effects of gamma radiation on sheep in foxholes up to 550 yards from ground zero, and lethal effects of gamma radiation on sheep above ground surface up to 900 yards from ground zero.

2. Severe blast damage on surface of ground up to 1700 yards from ground zero. Blast destruction effect falls off rapdily beyond the 1700 yard mark.

[redacted]

3. Fires ignited in desert vegetation by thermal radiation beyond 3500 yards from ground zero by each shot.

In using the damage effects data contained in Annex IV, it should be kept in mind that only one of the tests, Shot Number Four, conducted during the entire exercise employed a regular tactical weapon detonated at an optimum height. However, in order to gain the maximum benefit from other tests, typical demonstration areas were set up for each shot to give added realism to the orientation and indoctrination of troop units and individual observers.

VIII. RECOMMENDATIONS

a. That a senior officer with appropriate staff be designated by Department of the Army and/or Army Field Forces for the overall coordination of future Army participation in atomic exercises, and for conduct of continuing liaison with appropriate agencies such as AEC and AFSWP.

b. That in future, an exercise director be appointed sufficiently far ahead of each atomic exercise to allow him to participate in the initial planning stages of the operation when conducted on Department of the Army and/or Army Field Forces level.

c. That future exercise directors be briefed in advance on programs intended by AFSWP for experimentation during atomic exercises.

d. That during the advance planning on Department of the Army and Army Field Forces level, technical services of the Department of the Army be fully apprised of the intended plans, to the end that each service may plan to take advantage of each individual atomic exercise for the testing of such technical equipment as it may desire. In order to prevent any possible confusion of display items in the display areas, this planning obviously must be thoroughly coordinated with the exercise director from the start of the basic planning period.

e. That psychological and physiological agencies of the Department of the Army, i.e., Human Resources Research Office and Operations Research Office, be also informed of the general plan for each exercise well in advance of the actual dates of participation in order that they may organize more completely their research planning on these subjects.

f. That quotas for troop observers and troop participation be continued on the same basis as for Exercise DESERT ROCK IV, to wit: for each individual atomic explosion, 500 observers and 1500 to 2000 troops.

g. That troop participation in future exercises be on a basis of as much participation from diversified units from all sections of the country as possible. It is visualized here that participating combat

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teams or task forces should be composed of as many small units of the size of companies or platoons as possible, in order that the experience and indoctrination gained in each exercise be given the greatest possible dissemination among troops in the Continental United States.

h. That on a progressive basis, with the object of disseminating important essential atomic information to them, civilian defense agencies be given a quota for representation at all future exercises.

i. That the course of indoctrination and instruction at Camp Desert Rock be thoroughly organized sufficiently in advance of future exercises, as follows:

(1) A highly competent instructor staff of at least five officers be designated for this duty and assigned for a continuous period of at least one year. This staff should be composed only of the most highly qualified Army officers or Armed Services officers, whether these officers, during the period of their assignments as instructors, are on detail with AFSWP or are on their normal service duties.

(2) That observers on TDY at Camp Desert Rock be organized in two categories:

(a) Officers or enlisted men who have had previous organized atomic instruction or indoctrination, i.e., as at Sandia, to report for one full day of review and indoctrination prior to the shot which they are sent to witness.

(b) Other observers who have had no previous indoctrination to report three days before each shot, in order that they may be given essential basic indoctrination on atomic theory, on the details of shot participation, and related subjects.

(3) That the course of instruction and indoctrination at Camp Desert Rock be officially recognized, in order that each participant receive full credit on his records for his participation, on the same basis as that given for attendance at Sandia.

(4) For other specific recommendations in connection with orientation and indoctrination, see Annex I.

j. That in conjunction with troop-observer indoctrination there be conducted at Camp Desert Rock the U.S. Army radiological safety monitoring school. This school must be on a larger scope than has heretofore been attempted, in order that the principles of radiological safety monitoring instruction be given as widespread dissemination among troops as possible. For other specific recommendations in connection with Radiological Safety, see Annex I.

[redacted]

k. That the exercise director be hereafter assigned, for each atomic shot, a sector of between 90 and 180 degrees on a radius from ground zero to any desired distance, so that troops participating would have free access of troop maneuver, without restrictions on their movements imposed by AEC or AFSWP blast lines, instrumentation, communication lines, or similar hindrances.

l. That the Department of the Army be given by AEC the responsibility for the planning and implementation of its own radiological safety plans in future exercises, subject to prior general policy decisions between AEC and Department of the Army in Washington.

m. That the radiation dosage limit for Armed Forces participation in future exercises be raised from the present three (3) roentgen limit. In view of the fact that this troop participation will invariably be for a brief period of time, it is believed that the dosage which the troops may safely take can be raised materially above the present level of three (3) roentgens. Although this level is doubtless a reasonably one for continuing exposure by AEC and AFSWP personnel over long periods of time, it is believed that it is too low for personnel such as troops who will not be exposed for long periods, and that its continuance will unduly hamper military experimentation.

n. That the distance of 7000 yards between ground zero and entrenched front line positions of Army (Armed Forces) troop observers and participants be decreased as follows, for atomic shots from towers or other static locations:

(1) That the main entrenching distance to witness explosions of atomic devices of an expected yield of 30 to 35 KT be 5000 yards.

(2) That for an expected yield of 25 to 30 KT be 4600 yards.

(3) That for an expected yield of 20 to 25 KT be 4200 yards.

(4) That for an expected yield of 15 to 20 KT be 3800 yards.

(5) That for an expected yield of 10 to 15 KT be 3500 yards.

(6) That for an expected yield of 5 to 10 KT be 3200 yards.

(7) That for an expected yield of 5 KT or less be 3000 yards.

For devices dropped from airplanes, each front line location should be evaluated separately, on the general basis of the above figures, commensurate with the probable error of drop from the aircraft.

It must be emphasized that the distances specified above are recommended solely from the point of view of estimated safety during peace-time

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indoctrination and that no implication concerning tactical doctrine is intended.

o. That the use of volunteers for specific tests, possibly closer in than the distances specified in subparagraph n above, be authorized in general by agreement between AEC and Department of the Army in Washington, and be subject to specific conditions agreed to at the Nevada Test Site in each case between AEC officials and the exercise director. These conditions should include agreement on the need for the data which such volunteer missions could produce, the specialized training to be given to these volunteers, consideration of possible adverse conditions such as wind conditions or error of drop for each case, and the overall control of these volunteers for their rapid evacuation in case dangerous exposure seemed evident.

p. That a small, lightweight, and efficient radiac indicator-counter be provided in lieu of the present bulky and heavy counters, for use by troop radiological safety monitors in the future. A lightweight device of the type needed is already under experimentation and development by AFSWP.

q. That future indoctrination in, test firing of, and experimentation with, atomic artillery and atomic guided missiles be conducted at the Nevada Test Site, or at a possible adjacent extension of the Site, under the exercise director, Camp Desert Rock.

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ANNEX III - PSYCHOLOGICAL

PSYCHOLOGICAL FINDINGS

Distribution of complete findings on Psychological Reactions will be made by the Human Resources Research Office and the Operations Research Office, to all addressees, when completed.

[redacted]